the classics. From 1909 until 1929 she taught in the public school systems of America, an experience of which she spoke as "traversing an intellectual desert of the most barren sort." This may serve to explain better than more precise words her reasons for shifting her career to botany. During the years from 1932 to 1938 she served as Secretary of the California Botanical Society, relinquishing these duties to devote more time to her work as Secretary to the Editorial Board.

Upon acquaintance one soon became impressed with the fact that Miss Crum was a woman of outstanding intellectual brilliance, that she had an engaging personality and a ready flow of wit and humor. She was devoted to her work and her several hobbies crowded one another for her attention. Her passing ends a career of uncommon usefulness; her life was a milestone in the history of a journal.—Herbert L. Mason.

THE XEROPHYLLOUS SPECIES OF PHILADELPHUS IN SOUTHWESTERN NORTH AMERICA

C. Leo Hitchcock

There are, in southwestern United States and northern Mexico, several species of *Philadelphus* which are xerophytic. These plants have a rather heavy indumentum on the lower surfaces of the leaves as well as on the calyces and on the epidermis of the twigs. Their leaves are small (1–3 cm. long), rather thick and leathery, and entire. Whereas the flowers of *Philadelphus* are usually borne in cymes or panicles of from three to many blossoms, the flowers of these members of the genus usually occur singly (rarely in two's or three's) at the ends of short leafy lateral branches. They have been placed in the group *Microphylli* by Rydberg (No. Amer. Fl. 22: 163. 1905) with no indication whether this group is of sectional or subgeneric rank. Since the precise taxonomic status of this and corresponding groups of the genus is not pertinent to this paper, the term "group" which was frequently used by Rydberg will be used.

Floristically, these small-leaved species are particularly interesting, since they occur chiefly in the lower levels of the larger mountain ranges from Texas to California. Since localized populations of each of the species are isolated by intervening deserts, geographical races have become differentiated from one another. As a unit they are readily distinguished from all other North American species of *Philadelphus,* yet it is quite apparent that they have been derived from, and are very closely related to, certain species of the *Mexicani* (Rydb. op. cit.). A general idea of the relationship of these sections as well as the geographic distribution of the *Microphylli* is expressed in the accompanying diagram (fig. 1).

Of the various species in the *Mexicani, Philadelphus affinis*

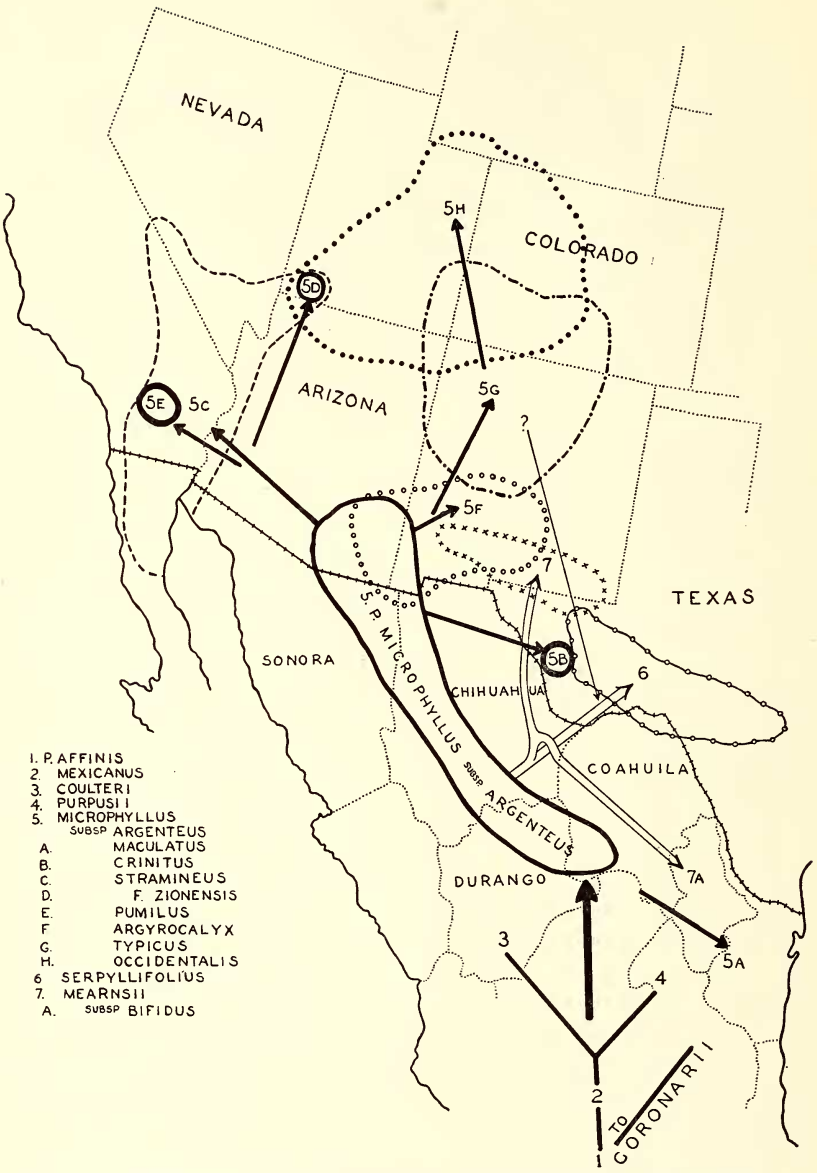

Fig. 1. Phylogeny and distribution of *Philadelphus* (*Microphylli*).

Schlect., a species of central Mexico, has leaves that are large, thin, and denticulate, 6–10 cm. long, and rather sparsely pubescent. Its petals are 1.5–2 cm. long, its styles are densely hairy,

and its inflorescence is a five- to eleven-flowered cyme. In general appearance it is very suggestive of the species of *Californici, Coronarii,* and *Grandiflori.* Another species of the same group, *P. mexicanus,* is quite similar to *P. affinis* in most particulars, but the plant is more pubescent and the inflorescence is greatly reduced, usually consisting of one, or of three, flowers at the ends of short lateral branches. A third species, *P. Coulteri,* has much smaller leaves (3–6 cm. long) which are more leathery and, although denticulate, are very densely hairy; the petals are considerably smaller (12–17 mm. long) and the inflorescence is usually one-(three-)flowered. The styles are densely hairy as is the upper part of the ovary.

Philadelphus Purpusii (*Microphylli*) although known from only one collection, is a well-marked species that is apparently closely related to *P. Coulteri,* having leathery, hairy leaves, and flowers that are quite similar to those of its supposed relative, but differing in that it has entire, small (2–3.5 cm. long) leaves, petals that are but 10–15 mm. long, and sparsely hairy styles. *Philadelphus microphyllus,* with its various subspecies, has apparently been derived from *P. Purpusii,* probably through the subspecies *argyrocalyx, argenteus,* and *crinitus,* all of which have the pubescence and leaves characteristic of *P. Purpusii.* In the first two of these subspecies there is even a trace of the pubescence of the styles and ovary that characterizes *P. Purpusii* and *P. Coulteri.*

The relationship of *P. serpyllifolius* and *P. Mearnsii* to the other species of *Microphylli* is not so apparent, but it is possible that they have been derived from *P. microphyllus.*

From the map it can be seen that the two subspecies of *Philadelphus Mearnsii* apparently are widely separated geographically. It seems probable, however, that more thorough collecting in northern Mexico will disclose that the plants are much more widely distributed than extant collections indicate. The typical form of the species was collected in 1892 and it was not until 1924 that the next collection was made, and that in a region remote from the type locality. Only two collections have been seen that were made since 1924, yet it seems certain that the plant is to be found in other parts of New Mexico, Texas, or Mexico.

The presence of what I consider to be a local population of *P. microphyllus* subsp. *typicus* in the Chisos Mountains of Texas is difficult to explain. As mentioned under the treatment of that subspecies, however, it is strongly suspected that these plants are really genetically different from the plants in central New Mexico, but aside from the fact that they are much greener in aspect, distinctive taxonomic characters are not discernible from the herbarium material examined.

Until the treatment of the genus by Rydberg in 1905, but few specific names had been proposed in the group. Rydberg not only recognized five species that had been described previously

but proposed seven additional specific entities. Since his work one or two additional names have been proposed. It was with the hope of evaluating the validity of these various species that this study was undertaken.

Herbarium material has been made available to me from the following institutions, their abbreviations, as I have used them in citing material, being shown in parentheses. University of California (C), Gray Herbarium (G), New York Botanical Garden (NY), Pomona College (P), Stanford, Dudley Herbarium (S), United States National Museum (US), University of Washington (Wash), State College of Washington, Pullman (WSC). To the curators of these herbaria I express my sincere appreciation.

Key to Species

A Lower surfaces of leaves grayish with short matted tomentum and (usually) longer straight appressed hairs; stamens mostly 28 (26–32 or more ?); styles less than 1 mm. long ..... 3. *P. serpyllifolius*

AA Lower surfaces of leaves green or grayish but never with tangled matted tomentum; stamens and styles various.

B Base of styles and adjacent ovary densely pilose; leaves coarsely strigose on both surfaces; calyces gray ..... 4. *P. Purpusii*

BB Base of styles and adjacent ovary glabrous or (very rarely) with few hairs; leaves and calyces various.

C Stamens 16–24, filaments distinct; styles less than 1 mm. long; pubescence of leaves very coarse, the hairs thick in cross section ..... 2. *P. Mearnsii*

CC Stamens more than 25, filaments often united at the bases; styles usually at least 1 mm. long; pubescence of leaves of slender hairs ..... 1. *P. microphyllus*

1. Philadelphus microphyllus Gray, Mem. Am. Acad. Sci. II, 4: 54. 1849.

Much branched, rounded shrub 1–2 m. tall; young branches densely pubescent with appressed hairs, often silvery, bark more or less reddish-brown to tan, usually exfoliating the second year, older branches grayish to grayish-brown; petioles 1–3 mm. long, leaf-blades ovate, ovate-lanceolate, or lanceolate, to lanceolate-elliptic, 8–35 mm. long, 3–15 mm. broad, entire, often slightly revolute, the apices rounded to acute, 3-nerved from base, pubescent with hairs that are minutely papillate their entire length, the upper surfaces either strigose with closely appressed hairs or hirsute with short erect hairs, but sometimes both strigose and hirsute, rarely glabrate, lower surfaces usually more densely hairy, the hairs either fairly long and partially appressed, or shorter, straight, and closely appressed; flowers borne singly or in threes (twos) on pedicels 0.5–3 mm. long, at ends of short leafy shoots;

calyx-tube 2–3 mm. long in flower, enlarging to 3–5 mm. in fruit, sparsely to densely strigose (glabrate), less commonly quite silvery with dense indumentum of tangled somewhat curled hairs, lobes 3–5 mm. long, acute to acuminate, outer surface glabrous to pubescent like the tube, inner surface always lanate; petals white to cream, 6–17 mm. long, usually rounded but often emarginate; stamens (30) 32 to about 70, the filaments usually partially united at least at base, but sometimes entirely free; styles (0.5) 1–2 mm. long, free above, or more commonly, united to tips; stigmas 1.5–3 mm. long, usually partially united.

Philadelphus microphyllus has been treated taxonomically in various ways. Many authors, like Rydberg, considered the plant as it occurs in central New Mexico to be specifically distinct from the many closely related forms of California, Nevada, Utah, and Arizona. It is true that it is largely a matter of interpretation whether these other entities be considered varieties, subspecies, or species, but certain characteristics upon which Rydberg based his species appear to me to be but normal variations largely accountable for by habitat. Still other differences which were used to characterize some of these segregates are not at all constant even though they may be genetic in origin, so that the maintenance of some of Rydberg's species, even as subspecific entities, does not seem feasible. One such characteristic is that of the degree of union of styles and stigmas. Although there is some variation in the length of the styles and in the degree to which they are united, I can find no consistent variation which can be correlated with other distinctive morphological characters or with geographical distribution. In some cases the styles of different flowers on the same specimen may be "united" and "partially free" (*Hitchcock et al. 4148,* C).

Although Rydberg listed definite and distinctive numbers of stamens for several of his closely related species (*P. stramineus* 30–40, *P. microphyllus ca.* 40, *P. minutus ca.* 60, *P. pumilus ca.* 30, and *P. argyrocalyx, P. ellipticus* and *P. occidentalis* "many"), the stamens are so inconstant in number that species cannot be distinguished in this manner. The normal number of stamens is seemingly a multiple of four, *P. stramineus,* for example, may have anywhere from thirty to forty, but usually has thirty-two, whereas *P. occidentalis, P. argenteus,* and *P. argyrocalyx* usually have from forty to sixty. There is often some variation in the stamens of flowers of the same branch, so that neither *P. pumilus* nor *P. stramineus* can be maintained on the basis of this character alone.

Leaf size, too, varies greatly, but the variation appears to be due chiefly to the age of the branch on which the leaves are produced or to the amount of shade in which the plant grows. As would be expected, plants which have grown in partial or complete shade have large leaves and rather sparse pubescence. The variation in leaf size due to branch age is best shown, perhaps, on

a plant collected by Rydberg and Garrett (no. *9608*). The leaves of a young shoot are well over 3 cm. in length, those of an older shoot are scarcely 1.5 cm. long. In a Heller and Heller collection (no. *3792*) nearly all plants have leaves from 2.2 cm. to 3.5 cm. in length; however, the sheet at Stanford bears a plant with leaves less than 2 cm. long. Another collection (*Harrison 6604*) made from a plant with leaves 6 to 8 mm. long had a two to three year old branch with leaves 9 mm. long. The three twigs of this branch bore new growth with leaves all 12 to 19 mm. long.

I can see no significant variations in the color, pubescence, or degree of exfoliation of the bark. It seems, therefore, that the characters that are dependable for subspecific delimitation are the following, listed in order of significance: type and amount of pubescence, number of stamens, leaf size, and flower size.

Key to Subspecific Variations of P. Microphyllus

A Petals with large purple spot at base ..... 1b. *P. microphyllus* subsp. *maculatus*

AA Petals not spotted with purple.
B Calyx-tube silvery, completely covered with long hairs.
C Pubescence of calyx matted, consisting of long straight hairs mixed with more slender intertwined hairs; leaves rather densely pubescent, the hairs of lower surfaces rather long and often not appressed, the upper surfaces much less pubescent and usually greenish ..... 1d. *P. microphyllus* subsp. *argyrocalyx*

CC Pubescence of calyx usually not matted, but if so, the hairs all of same type, often the pubescence too sparse to be tangled.
D Calyx shaggy with long matted slender hairs; both surfaces of leaves grayish with long slender hairs, these sometimes somewhat matted on the lower surfaces ..... 1c. *P. microphyllus* subsp. *crinitus*

DD Calyx with appressed pubescence chiefly, the hairs not tangled; leaves mostly distinctly greenish above, if grayish the hairs not at all matted.
E Upper surfaces of leaves with hirsute pubescence, the hairs erect or nearly so.
F Stamens usually 40 or more; leaves mostly over 15 mm. long, the pubescence of lower surfaces not tightly appressed ..... 1d. *P. microphyllus* subsp. *argyrocalyx*

FF Stamens usually 32; leaves often less than 15 mm. long, the pubescence of lower surfaces rather tightly appressed.
G Hairs of upper surfaces of leaves all essentially of the same length .... 1f. *P. microphyllus* subsp. *stramineus* forma *zionensis*

GG Hairs of upper surfaces of leaves mainly short and erect, the remainder less numerous, longer and more appressed . 1g. *P. microphyllus* subsp. *pumilus*

EE Upper surfaces of leaves with strigose pubescence, the hairs appressed.
H Stamens usually 40 or more, some usually united half their length; leaves mostly over 15 mm. long .. 1a. *P. microphyllus* subsp. *argenteus*

HH Stamens usually 32, free or united only at base; leaves seldom over 15 mm. long ... 1e. *P. microphyllus* subsp. *stramineus*

BB Calyx-tube not silvery, or at least not completely covered by pubescence.
I Leaves hirsute above, the hairs erect or nearly so.
J Leaves usually 8–12 mm. long, the pubescence of lower surfaces of appressed hairs, that of the upper surfaces consisting of many short erect hairs mixed with less numerous, longer, subappressed hairs ..... 1g. *P. microphyllus* subsp. *pumilus*

JJ Leaves 8–30 mm. long, the hairs of lower surfaces not appressed, or those of the upper surfaces all of one type.
K Stamens usually 40 or more; leaves commonly at least 15 mm. long, the hairs of lower surfaces not always tightly appressed ..... 1d. *P. microphyllus* subsp. *argyrocalyx*

KK Stamens usually about 32 (to 40); leaves 8–15 mm. long, the hairs of lower surfaces appressed ..... 1e. *P. microphyllus* subsp. *stramineus*

II Leaves not hirsute above, the hairs appressed.
L Petals 11–17 mm. long; hypanthium with but little pubescence, this chiefly at the angles ..... 1h. *P. microphyllus* subsp. *typicus*
LL Petals seldom over 10 mm. long; hypanthium various but often quite densely pubescent.
M Filaments usually united at least one-third their length; calyx-tube silvery; leaves mostly 20–30 mm. long, not hirsute ... 1a. *P. microphyllus* subsp. *argenteus*
MM Filaments free or united at base only; calyx-tube not silvery, or if so, leaves usually less than 20 mm. long.
N Stamens usually about 32; entire outer surface of calyx quite densely pubescent with stiff straight appressed hairs, the outer surface almost completely covered by hairs ..... 1e. *P. microphyllus* subsp. *stramineus*
NN Stamens usually 40 or more; the outer surface of calyx sparsely pubescent or even partially glabrous, in any case not hidden by hairs ..... 1i. *P. microphyllus* subsp. *occidentalis*

1a. Philadelphus microphyllus subsp. **argenteus** (Rydb.) comb. nov. *P. argenteus* Rydb. N. Am. Fl. 22: 171. 1905. *P. argyrocalyx* var. *argenteus* (Rydb.) Engl., Engl. & Prantl, Nat. Pflanzenf. II, 18a: 193. 1930. *P. microphyllus* var. *argenteus* (Rydb.) Kearney & Peebles, Journ. Wash. Acad. Sci. 29: 480. 1939. *P. Palmeri* Rydb. N. Am. Fl. 22: 173. 1905; type: Sierra Madre, 40 miles south of Saltillo, Mexico, *Palmer 2122*. *P. madrensis* Hemsl. Kew. Bull. 251. 1908; type: Sierra Madre, Durango, Mexico, *Seemann 2167*.

Leaves mostly 20–35 mm. long, ovate-lanceolate or lanceolate, pubescence of lower surfaces grayish-strigose, upper surfaces sometimes glabrate; calyx more or less canescent with long straight appressed hairs which are often mixed with shorter more slender ones; petals 8–11 (12) mm. long, often pubescent on outer surfaces near the base; stamens 40 or more, filaments usually united at least at the base and often united to near the

tip, usually grouped in irregular phalanges; styles sometimes sparsely hairy near base.

Type. Fort Huachuca, Arizona, *Dr. T. E. Wilcox* in 1893.

Range. Mountains of southeastern Arizona, south into Sonora, Chihuahua, Coahuila, and Durango, Mexico.

Material seen. Arizona. Coronado Mts., *Goldman 2379* (US); Santa Rita Forest Reserve, *Griffiths 4194* (US). Santa Cruz County: near Patagonia, *Harrison 7180* (C, NY). Cochise County: Bisbee, *Carlson* in 1915 (US); Fort Huachuca, *Wilcox* in 1893, type collection (NY), *Wilcox* in 1873 (NY), probably should read 1893, surely part of type collection; *Wilcox* in 1892 (NY), and *Wilcox 234* (US); Huachuca Mts., Ramsey Canyon, *Jones 24913* (P) and Millers Canyon, *Goodding 147* (G, NY, US); between Fort Huachuca and San Pedro River, *Mearns 1540* (US); Chiricahua Mts., Barfoot Park, *Blumer 1303* (G, NY, S, US); Barfoot Fire Station, *Eggleston 10766* and *10794* (US); Upper Pine Canyon, *Burrall* in 1906 (US); Dos Cabezas, *Lemmon* in 1881 (C). Graham County: Mt. Graham, *Peebles, Harrison,* & *Kearney 4449* and *4450* (US). Pima County: Santa Catalina Mts., *Lemmon* & *Lemmon* in 1881 (C); Santa Rita Mts., *Pringle* in 1881 (G, NY, P, US) and *Peebles* & *Harrison 3000* (US); Rincon Mts., Spud Range, *Blumer 3565* (C). Mexico. Chihuahua: Guayanopa Canyon, Sierra Madre Mts., *Jones* in 1903 (P); San Luis Mts., *Goldman 1432* (US). Sonora: San Jose Mts., *Mearns 1617* (US). Coahuila: Sierra Madre, 40 miles south of Saltillo, *Palmer 2122,* type collection *P. Palmeri* (G); Sierra de Parras, *Purpus 4592* (G, US).

Philadelphus microphyllus subsp. *argenteus* approaches subsp. *stramineus* and subsp. *pumilus* in the pubescence of the calyx, but is larger-leaved than either and the pubescence of the leaves is all appressed. It is also quite similar to subsp. *argyrocalyx* but differs because the leaves are not hirsute, their lower surfaces have more appressed pubescence, and the pubescence of the calyx is more uniform.

There is scarcely any difference between the type of *P. Palmeri* and the type of subsp. *argenteus* except that the filaments are more completely united in the former. Pubescence, leaf size and shape, and flower size are alike in the two. Rydberg surely had seen only the type specimen when he described *P. Palmeri,* but the Purpus collection, made in 1910, is annotated by Rydberg as *P. Palmeri* and shows that he must have had to change his concept of the species considerably, since the flowers of that collection have petioles that are but 1.5 mm. long (original description of *P. Palmeri* specified 1.5 cm., although this is probably a typographical error), petals that are 9–12 mm. long (12 in original description), styles that are *not* distinct, and a hypanthium that is as long as it is in most of the other subspecies of the complex. The only possible basis for maintaining *P. Palmeri* even as a sub-

species would be the union of the filaments. However, much of the material from Arizona that is surely *P. argenteus* has filaments as completely united as are the filaments of the flowers of the two collections of *P. Palmeri* (*Pringle* in 1881, Santa Rita Mts., and *Blumer 1303*).

Philadelphus madrensis is being reduced to synonymy even though the type (*Seemann 2167*, Sierra Madre, Durango) has not been seen. That plant, it will be noted, was collected very near the type locality of *P. Palmeri*, and the original description of *P. madrensis* fits *P. Palmeri* quite well. The "1–3-flowered inflorescence, and subsessile, acute, entire, 3-nerved, sericeous-pilose leaves" are similar to those of the type of the latter species and therefore to those of subsp. *argenteus*. There is nothing distinctive about the flowers, the stamens being more or less connate into four phalanges and the ovary either glabrous or slightly pilose on top. In fact one could scarcely compose a description that would apply more closely to *Philadelphus microphyllus* subsp. *argenteus* than does the description of *P. madrensis* except that the stamens are said to be about thirty-two, whereas in the specimens of *P. argenteus* I have seen there have been forty or more. This discrepancy notwithstanding, it seems safe to assume that *P. madrensis* is identical with *P. Palmeri* and therefore with subsp. *argenteus*.

There is the possibility that this is the same plant as *P. asperifolius* (Koern. Gartenflora 16: 73. 1867) but in the absence of proof of this identity, that name is not being used. Rydberg's separation of *P. asperifolius* on the basis "bark of previous year's growth not exfoliating" is inconclusive.

1b. Philadelphus microphyllus subsp. **maculatus** subsp. nov.

Foliis lanceolatis vel ellipticis-lanceolatis, 1.5–2.5 cm. longis, ca. 4 (3–8) mm. latis, viridis, appresso-pubescentibus; calicibus purpureis, cum pilis adpressis tenuibusque pubescentibus, cineraceis, tubo ca. 3.5 mm. longo, lobis 4–5 mm. longis, abrupto-acuminatis; petalis oblongo-ovatis, ca. 12 mm. longis, albis, petalo inferiore purpureo-maculato; staminibus 32–40, plus minusve in phalangibus ex 2–8 filamentis conjunctis, interdum ad proximum apicem connatis; stigmatibus ca. 3 mm. longis, saepe absoluto-connatis; stylis ca. 1.5 mm. longis, ad basum sparse pilosis.

Leaves lanceolate to elliptic-lanceolate, 1.5–2.5 cm. long, *ca.* 4 (3–8) mm. broad, both surfaces greenish, the pubescence appressed; calyces purple, finely appressed pubescent and rather cineraceous, the tube *ca.* 3.5 mm. long, the lobes 4–5 mm. long, abruptly acuminate; petals oblong-ovate, *ca.* 12 mm. long, white with distinct purplish blotches at base, sometimes with this purple spot extending to upper half or even to tip of petal; stamens 32–40, irregularly united into phalanges of 2–7 or 8 filaments, these sometimes connate to near tip; stigmas *ca.* 3 mm. long, usually

completely united, styles *ca.* 1–5 mm. long, sparsely strigose at base.

Type. In forest of large pines, forest floor of low vegetation, mountain top, 7 kilometers southwest of Miquihuana, Tamaulipas, Mexico, lat. 23° 42′ N., long. 99° 45′ W., elev. 3430 m., August 5, 1941, *Stanford, Retherford, and Northcraft 690* (Wash).

This showy-flowered form of *Philadelphus microphyllus* is closely related to subsp. *argenteus,* but differs not only in the purple-spotted petals, but also in the narrower, greenish leaves. This greenness may be due, in part at least, to the fact that the plants were probably partially shaded.

It is known only from the type collection but the collectors report that it was fairly abundant, that all plants seen had the spotted petals, and that their collection, of about ten herbarium sheets, was made from about four different shrubs.

1c. Philadelphus microphyllus Gray subsp. **crinitus** subsp. nov.

Folia 15–25 mm. longa, supra alba, adpressa-strigosa, subtus simplicatio-strigosa, calicibus extra albis implicatis-strigosis; petalis ca. 11 mm. longis; staminibus 48–68, filamentis basi connatis; stylis 1–1.5 mm. longis, connatis; stigmatibus connatis.

Leaves mostly 15–25 mm. long, pubescence of the upper surfaces grayish, strigose, the hairs appressed, pubescence of the lower surfaces densely long strigose, the hairs often somewhat tangled; calyces gray with long more or less matted slender hairs; petals *ca.* 11 mm. long; stamens 48–68, united at base; styles 1–1.5 mm. long, united; stigmas 3–4 mm. long, united.

Type. Rocky ground near top of Mount Livermore, Davis Mountains, Jeff Davis County, Texas, June 4, 1928, *E. J. Palmer 34347* (NY).

Other material seen. Texas. North side Mount Livermore, *Palmer 34364* (NY); Livermore Peak, *Ferris & Duncan 2529* (NY, S).

The status of this entity is puzzling. By some workers it has been mistaken for *P. serpyllifolius,* but it differs so markedly from that species in pubescence, stamen number, style and stigma length, and general appearance, that a close relationship between the two seems doubtful. It is probable that it is much more closely related to *P. argyrocalyx* or even to *P. argenteus,* both of which it strongly resembles in general aspect, but the pubescence of the calyx and leaves is so unique that it cannot be combined with either. Since the flowers are so like those of the other subspecies of *P. microphyllus* there is not an adequate basis for according the plant specific recognition.

1d. Philadelphus microphyllus subsp. **argyrocalyx** (Wooton) comb. nov. *P. argyrocalyx* Woot. Bull. Torrey Bot. Club 25: 452. 1898. *P. serpyllifolius* var., Gray, Pl. Wright. 2: 64. 1852. *P. ellipticus* Rydb. N. Am. Fl. 22: 172. 1905; type: Mesilla Park,

New Mexico, *Tinsley* in 1896, probably wrong locality (Woot. & Standl., Contr. U. S. Nat. Herb. 19: 300. 1915).

Much like subsp. *argenteus* in general appearance but leaves hirsute on upper surfaces and usually with less appressed, but somewhat longer, looser, hairs on lower surfaces; calyces typically grayish with matted mixture of long straight and slender curled hairs, but pubescence sometimes less abundant and calyces then scarcely grayish; petals 8–11 (17) mm. long, often pubescent near base on the outer surfaces; stamens usually 40 or more, filaments commonly partially united, often united to near tips; styles united, sometimes sparsely hairy near base; stigmas at least partially united.

Type. Eagle Creek, White Mountains, Lincoln County, New Mexico, *Wooton 524*.

Range. Mountains of south central and western New Mexico into southeastern Arizona, south into Chihuahua, Mexico.

Material seen. New Mexico. Lincoln County: White Mts., *Wooton 524,* type collection (NY, US) and *Wooton* in 1901 and 1905 (US); West Peak, El Capitan Mts., *Earle & Earle 220* (NY); Mesilla Park, *Tinsley* in 1893, type collection *P. ellipticus* (NY, US); Ruidoso Creek, *Wooton* in 1895 (US). Otero County: head of Rio Fresnal, *Barlow* in 1911 (C); Cloudcroft, Sacramento Mts., *Rehder 372* (US), *Eggleston 14541* (US), *Wooton* in 1899 (US), and *Orcutt 1351* (US). Without definite locality, *Wright 1101,* the plant which Gray called *P. serpyllifolius* var., therefore from "mountain sides at the Copper Mines" (G, NY, US).

When Wooton described *P. argyrocalyx* he included therein the Wilcox collection from Arizona. That plant was later made the type of Rydberg's *P. argenteus.* The two entities are similar and undoubtedly they are closely related; in many areas they grade into one another. Yet subsp. *argyrocalyx,* as it occurs in Lincoln County, New Mexico, is very unlike any collections of *Philadelphus* from Arizona, the pubescence of the calyx being much more curled and matted, consisting not only of matted curled trichomes but also of long straight hairs. The leaves are conspicuously hirsute with short erect hairs, a condition which is characteristic of nearly all material from southwestern New Mexico but not of the plants from Arizona. However, material becomes more and more like subsp. *argenteus* near the Arizona border until, in the mountains of extreme southeastern Arizona, the material is intermediate in nature between the two subspecies. The following collections therefore are not quite identical with the type collection and some are at least as similar to subsp. *argenteus* as to subsp. *argyrocalyx.* All have hirsute leaves. New Mexico. Sierra County: Mimbres Mts., Hillsboro Peak, *Diehl 626* (P). Soccoro County: San Mateo Peak, *Goldman 1745* (US). Grant County: Burro Mts., *Metcalfe 173* (C, G, NY, P, S, US), quite typical as to leaves, the calyx almost the same as in material

from the type locality, the petals pubescent; Animas Peak, *Goldman 1370* (US). Valencia County: mountains west of Grants Station, *Wooton 1109* (US). Arizona. Oak Creek, *Goldman 2174* (US). Pinal County: Superstition Mts., *Harrison 6604* (NY). Cochise County: Chiricahua Mts., *Price* in 1894 (S) and *Jones 28327* (C, P), Barfoot Park, *Blumer 1291* (G, NY, S), very close to *P. argenteus,* but calyx very sparsely hairy, the leaves hirsute, however; White River Canyon, Chiricahua Mts., *Toumey* in 1894 (C); Upper Pine Canyon, *Burrall* in 1906 (US). Pima County: Mt. Lemmon, Santa Catalina Mts., *Livingston* & *Thornber* in 1906 (NY); Santa Catalina Mts., *Lemmon* & *Lemmon 186* (C) and *Lemmon 170* (G); near Mud Springs, *Harris C16344* (US). Graham County: Pinaleno Mts., Bonita, *Munz 1248* (P). Mexico. Chihuahua: Colonia Juarez, Sierra Madre Mts., *Jones* in 1903 (NY, P, US).

Other collections are more intermediate with subsp. *typicus:* Hillsboro Peak, Sierra County, New Mexico, *Metcalfe 1323* (C, G, NY, P, US). The plants of this collection have silvery leaves and united stamens (characters of subsp. *argyrocalyx* but the calyces, as in subsp. *typicus,* are nearly glabrous.

1e. Philadelphus microphyllus Gray subsp. **stramineus** (Rydb.) comb. nov. *P. stramineus* Rydb. N. Am. Fl. 22: 172. 1905.

Much the same as subsp. *occidentalis,* but the calyces usually canescent with stiff straight appressed hairs; leaves mostly 10–25 (probably averaging about 15) mm. long, pubescence of both surfaces usually appressed, if hairs more erect, then all approximately the same length; petals 7–10 mm. long, their outer surfaces sometimes pubescent at base; stamens 30–50 but usually 32, the filaments from scarcely united to united to near the tips.

Type. White Mountains, Mono County, California, *Shockley* in 1888.

Range. Foothills and lower levels of the Charleston Mountains of Nevada, White Mountains of California, and San Pedro Martir Mountains of Lower California. Probably more widespread than present collections indicate.

Although it is believed that subsp. *stramineus* is a valid entity, if it is to be maintained it must be on a different basis than that used by Rydberg. It was keyed by him on the following characters: "Leaf blades equally grayish on both surfaces; sepals acute; bark of the old stems straw colored," whereas *P. microphyllus,* in contrast, had "leaf blades paler beneath; sepals acuminate; bark of the old stems gray." The leaf-blades of the Shockley collection are *paler* on the lower surfaces than on the upper; the sepals are just as sharp-pointed as are those of much of the material of *P. microphyllus* subsp. *typicus;* lastly, although it is true that the older bark of the type collection of *P. stramineus* is not grayish, in other collections of that entity from the White Mountains (*Cassel*

262), the bark is as weathered and gray as that of any material from New Mexico.

The unique characteristics of the entity are as follows: the calyces of subsp. *stramineus* are grayish with dense stiff straight hairs, in this respect being more similar to subsp. *argenteus* than to either subsp. *occidentalis* or subsp. *typicus*. Usually there are fewer stamens (thirty-two being the commonest number) per flower than in subsp. *argenteus,* subsp. *occidentalis,* or subsp. *typicus,* but since there are occasional plants with as many as forty stamens per flower (*Percy Train 2178,* from the Charleston Mountains), too much importance should not be ascribed to this peculiarity of subsp. *stramineus*.

Material seen. Nevada. Clark County: Charleston Mts., *Clokey & Clokey 7133* (NY, S, Wash), *Clokey 5458* (NY, S, Wash), *Clokey 5490* (NY, S, Wash), *Heller 10998* (C, NY, S, US), *Clokey 7540* (G), *Percy Train 2178* (NY), *Jones* in 1927 (P), and *Jaeger* in 1925 (P). California. Inyo County: White Mts., Black Canyon, *Cassel 262* (S) and *Duran 540* (C, NY, P, S, US), Wyman Canyon, *Ferris 6966* (S); Crag Canyon, Grapevine Mts., *Gilman 3262* and *3259* (P). Mono County: White Mts., *Shockley* in 1888 (NY, type) and *Shockley 454,* probably type collection also (C, G, S, US). Mexico. Lower California. San Pedro Martir Mts., Vallecitos, *Goldman 1223* (US); San Pedro Martir, *Brandegee* in 1893 (C) and *Heller* in 1902 (C); La Encantada, *Wiggins & Demaree 4947* (C, G, NY, P, S, US); east of La Encantada, *Melinge* in 1931 (P, S, US). Some of these collections from Lower California approach subsp. *pumilus* in that the upper surfaces of the leaves tend to be hirsute with short erect hairs; further collections may prove that they more properly belong with that entity.

Material from Zion National Park is unique in that the pubescence of the upper surfaces of the leaves is short hirsute rather than strigose. In this respect the plants resemble subsp. *pumilus,* but that entity has long, appressed hairs mingled with the short erect ones, whereas the material from Zion Canyon is hirsute with hairs of uniform length. Also, the leaves of the plants from California are smaller. This variant from Utah is therefore accorded minor status as follows.

1f. Philadelphus microphyllus Gray subsp. stramineus (Rydb.) C. L. Hitchc. forma zionensis forma nov.

Planta a subsp. *stramineus* differens: folia supra pilosula.

This form differs from subsp. *stramineus,* in the leaves which are hirsute above with short semi-erect hairs of uniform length.

Type. Near summit of Lady Mountain, Zion National Park, Washington County, Utah, June 19, 1928, *T. Craig 1439,* Pomona College Herb. no. 184362.

Range. Known only from Zion Canyon, Utah.

Material seen, in addition to the type. Zion Canyon, *Jones* in 1923 and in 1925 (P), *Garrett R2669* (NY), and *Woodbury 19* (US); "Utah," *Ward 699* (US).

1g. Philadelphus microphyllus subsp. **pumilus** (Rydb.) comb. nov. *P. pumilus* Rydb. N. Am. Fl. 22: 173. 1905.

Much like subsp. *stramineus,* especially as to pubescence of the calyces, but leaves usually averaging no more than 8 mm. long, their upper surfaces hirsute with many short stiff erect hairs mixed with fewer and longer more appressed hairs; petals 6–10 mm. long, usually slightly pubescent on the outer surfaces near base; stamens 32 (to 50), the filaments free or united at base only; styles from completely united to almost entirely free.

Type. Tamarack Valley, San Jacinto Mountains, Riverside County, *Hall 2500.*

Range. Apparently restricted to the San Jacinto and Santa Rosa Mountains of southern California at 7000–8500 feet elevation. Possibly also in Lower California (see under subsp. *stramineus*).

Material seen. California. Riverside County: Santa Rosa Mts., *Munz 15392* (Wash); San Jacinto Range, *Hall 800* (S); San Jacinto Mts., near Tamarack Valley, *Hall 2500,* type collection (C, NY, S, US); Dark Canyon, *Munz 8762* (P) and *Munz & Johnston 8738* (P); Long Valley to Palm Springs Trail, *Jaeger 1015* (C, P); above Chino Canyon, *Jaeger* in 1922 (S, US).

The variation in the degree of union of the styles is easily seen in this phase of the species. The flowers of the type collection have styles completely united, even the stigmas being united over half their length in a few cases. The collection made by Munz and Johnston is so similar to the type that Rydberg surely would have called them conspecific, yet the styles of this collection are free nearly to the ovary. It is because of such instances that the union or non-union of the styles is considered of secondary importance as a diagnostic character.

1h. Philadelphus microphyllus Gray subsp. **typicus** nom. nov. *P. microphyllus* Gray, *l.c.;* Rydb. N. Am. Fl. 22: 172. 1905.

Leaves (12) 17–35 mm. long, ovate-lanceolate to lanceolate, strigose on both surfaces to glabrate above, the hairs all appressed but the upper surfaces usually greenish; calyces glabrate to moderately strigose, the tube 2–4 mm. long, usually strigose on the angles, the lobes often glabrous on the outer surfaces, moderately lanate on inner surfaces; petals 11–17 mm. long, not pubescent on the outer surfaces; stamens mostly 40–52 (32), practically free except for few that are geminate.

Type. Eleven miles above Santa Fe, on Santa Fe Creek, New Mexico, June to July, 1847, *Fendler 266.*

Range. Central and northern New Mexico, southern Colorado, and Apache County, Arizona; also from the Chisos Mountains of Texas.

This, the typical form of the species, characterized chiefly by the large flowers and sparse pubescence of the calyx, is the only phase of the species found in northern New Mexico. It inter-

grades with subsp. *occidentalis* on the north and west, and with subsp. *argyrocalyx* on the south. Although most of the flowers of the type collection have about thirty-two stamens, the number of stamens present in the bulk of the material seen is between forty and fifty-two.

Material seen. New Mexico. Rito de las Frijoles, *Cockerell* in 1912 (US). Socorro County: Beartrap Canyon, San Mateo Mts., *Eggleston 18654* (NY, US); Hop Canyon, Magdalena Mts., *Diehl 463* (P) and *Herrick 608* (US), Copper Canyon, Magdalena Mts., *Goldman 1669,* intermediate with subsp. *argyrocalyx* (US). Bernalillo County: Albuquerque, *Jones* in 1884 (P). Valencia County: Grant's Station, *Wooton* in 1892, approaching subsp. *argyrocalyx* (NY). Sandoval County: Balsam Park, Sandia Mts., *Ellis 107* (NY, US); Sandia Mts., *Herrick* in 1898 (US); Placitas, Sandia Mts., *Wooton* in 1910 (US); Ellis Ranch, Sandia Mts., *Wooton* in 1910 (US); Guadalupe Canyon, San Mateo Mts., *Eggleston 18736* (US). Santa Fe County: Santa Fe Creek, *Fendler 266,* type collection (G, NY, US); Santa Fe Canyon, *Heller & Heller 3792* (G, NY, P, S, US) and *Wooton* in 1910 (US); near Santa Fe, *Arsène & Benedict 15742* (US). San Miguel County: mouth of Indian Creek, *Standley 4547* (G, NY, US). Taos County: Taos River Canyon, *Nelson 11471* (C, G); Red Canyon, near Questa, *Hitchcock et al 4148* (C, P, Wash, WSC). Colorado. Las Animas County: Brantley Canyon, *Osterhout 2077* (C, NY, P); Mesa de Maya, 60 miles east of Trinidad, *Rollins 1835* (NY, WSC). Montrose County: Cimarron, *Nelson & Nelson 425* (C), with some doubt as no petals present. Fremont County: west of Parksdale, *Jones* in 1913 (S); Royal Gorge, *Bacigalupi 1009* (NY, P, S), without petals, hence some doubt; Canyon City, *Brandegee 84* (C). Utah. Grand River near Moab, *Jones* in 1915, intermediate with subsp. *occidentalis* (NY). Arizona. Canyon de Chelly, *Nelson 36,* almost surely belongs here but no flowers on plant so identity cannot be certain (US).

Several collections from the Chisos Mountains, Texas, must be placed here, even though they have smaller flowers than those common to the material from New Mexico. At first glance these Texan plants appear to be sufficiently different to be maintained as a separate entity, but it has been found to be impossible to construct a key that will separate them from subsp. *typicus.* Their leaves are quite green when dried, but this condition may be due to the care with which they were preserved; the stamens vary in number from twenty-nine to forty per flower; the flowers are about the size of those of subsp. *occidentalis,* but the leaves and calyces are more nearly glabrous than they are in that plant. It is entirely possible that these plants will prove to be genetically distinct from either subsp. *typicus* or subsp. *occidentalis,* but field study will be necessary in order to detect distinguishing characters, if such there be. Texas. Brewster County, Chisos Moun-

tains: Mt. Emory, *Warnock 866* (US), Upper Boot, *Cory 7076* (P) and *Cory 7077* (G); 2 miles southwest of Boot Spring, *Moore & Steyermark 3160* (C, G, NY, S); Lost Mine Peak, *Ferris & Duncan 2856* (NY, S); with no further locality, *Mueller 8013* (NY) and *Havard 40* (G).

1i. Philadelphus microphyllus Gray subsp. **occidentalis** (Nelson) comb. nov. *P. occidentalis* Nelson, Bull. Torrey Bot. Club 25: 374. 1898. *P. minutus* Rydb., N. Am. Fl. 22: 173. 1905; type, Black Canyon of the Gunnison, Colorado, *Baker 266*. *P. nitidus* Nelson, Bot. Gaz. 42: 54. 1906; type, Sapinero, Colorado, *Wheeler 425*. Second cited specimen was *Baker 266*, hence *P. nitidus* is surely the same as *P. minutus*.

Pubescence much the same as in subsp. *typicus*, the leaves often glabrate above, mostly 10–16 (to 25) mm. long, elliptic-lanceolate to lanceolate; petals 9–11 mm. long, not pubescent on outer surfaces; stamens usually about 40 (29–45), united at base only, if at all; styles wholly united or free one-third to one-half their length.

Type. Near Rock Springs, Sweetwater Canyon, Wyoming, July 25, 1897, *Smith 3595*.

Range. Central and northern Colorado, southwestern Wyoming, and eastern Utah.

The subsp. *occidentalis* merges with the subsp. *typicus* and is distinguished from that phase with some difficulty. In general, however, it has smaller flowers and leaves. In the western part of its range it also intergrades with subsp. *stramineus* but can usually be distinguished from that plant because of its greater number of stamens (forty or more as compared with thirty-two) and less pubescent calyces.

There can be little doubt that *P. nitidus* and *P. minutus* are the same entity since Nelson cited three collections of *P. nitidus*, one of which was collected by Baker (no. *266*), in Black Canyon, Colorado. This is the same collection which Rydberg, a year previously, had selected as the type of his *P. minutus*. Nelson specified that *P. nitidus* had "styles distinct down to the ovary." Rydberg claimed *P. minutus* had "styles united one-half to two-thirds their length." Although I have seen no flower which I would describe as having styles distinct to the ovary, I am convinced that the degree of union of the styles is not a particularly dependable character. One of the other two collections which Nelson cited under *P. nitidus* (*Jones 6303*), from Belknap, Utah, has the styles united to the stigmas in the flowers I have examined. Thus it seems evident that free or partially free styles are not a constant characteristic of subsp. *occidentalis*. Neither are the styles of subsp. *typicus* always united, for example, in a collection from the Sandia Mountains, New Mexico (*Ellis 107*), they are but incompletely united.

Philadelphus minutus was separated from *P. occidentalis* in

Rydberg's key on the basis that the styles were partially free in the former; thus it can be seen that Rydberg and Nelson both believed their species to be unique and separable from *P. occidentalis* for the same reason. I hesitate, therefore, to reduce *P. minutus* to synonymy but can find no true criterion by which it can be maintained as distinct in any way from *P. occidentalis.* The calyx-tube, according to Rydberg, is 2 mm. long both in *P. occidentalis* and *P. minutus,* whereas it is "4–5 mm. long" in *P. microphyllus.* I do not believe that there is any such difference. Surely Rydberg could not have taken his measurements for the two species from flowers at the same stage of development as it is possible to find flowers of nearly equal size on plants which Rydberg would have called *P. microphyllus, P. minutus,* and *P. occidentalis,* respectively.

According to Nelson, *P. occidentalis* has styles "free for from one-third to one-half their length." Rydberg said of it "styles usually wholly and the oblong or clavate stigmas partly united." Both conditions prevail and can be seen in the material here cited.

Material seen. Colorado. S. Colorado, *Palmer* (US) and *Popenoe* in 1876 (US). Garfield County: Glenwood Springs, *Palmer 38115* (NY, US). Montrose County: Cimarron, *Jones* in 1890 (P) and in 1925 (P); Black Canyon of the Gunnison, *Baker 266,* type collection of *P. minutus* (C, G, NY, P, US); Newcastle, *Cary 153* (US). Fremont County: Canyon City, *Brandegee* in 1877 (C) and *Osterhout 2092,* very close to subsp. *typicus* and possibly really that form (P); Cotopaxi, *Johnston & Hedgecock 740* (NY); Royal Gorge, *Clokey 3791* (C, G, NY, P, S, US, WSC) close to subsp. *typicus* but calyx somewhat more pubescent; Oak Creek Canyon, *Rollins 1240* (G, NY). Wyoming. Sweetwater County: near Rock Springs, *Smith 6919* and *Nelson 3595* (G, NY, US). This last collection is from the exact type locality and is the same number as the type but that collection was asserted to have been made by R. A. Smith rather than by Nelson. Utah. Daggett County: 12 miles south of Manila, *Hitchcock et al 3912a* (C, P, S, WSC). Carbon County: Cottonwood Canyon, *Graham 9520* (G). Beaver County: Beaver City, *Palmer 151* (G, NY); S. Utah, *Palmer 151* (US). Grand County: Thompson's Springs, *Jones* in 1913 (G, P, US, WSC); Grand Canyon, *Graham 9916* (G).

The following collections are also being referred to subsp. *occidentalis,* although they intergrade, in greater or lesser degree, with subsp. *typicus.* Utah. Grand County: Moab, *Jones* in 1913 (C, G, NY, S, US) and in 1891 (P), these plants are peculiar in that they have large thick leaves that are semi-glabrous on the upper surfaces; near Wilson Mesa, *Rydberg & Garrett 8380* (NY). Summit County: Brush Creek Canyon, Uintah Mts., *Goodding 1274* (G, NY, US); Brush Creek Gorge, *Graham 10015* (US). Uintah County: Ashley Creek, near mouth of Dry Fork, *Graham*

6270 (US); 10 miles northwest of Vernal, *Graham 7454* (G). San Juan County: Abajo Mts., *Rydberg & Garrett 9608* and *9609* (NY, US); La Sal Mts., *Purpus 6611* (C, P, US), near Clarke Lake, *Maguire et al 5803* (C), road to Warner Ranger Station, *Maguire et al 5802* (C, US); locality uncertain, "marvine laccolite" only data on label, hence probably also from the La Sal Mts., *Jones 5663v* (C, NY, P, US). Arizona. North end Carrizo Mts., *Standley 7323* (US, with some doubt, as flowers lacking). Apache County: Luka-Chukai Mts., *Goodman & Payson 2843* (NY, Wash).

In the southwestern part of Utah and in northwestern Arizona subsp. *occidentalis* merges with subsp. *stramineus*. The following collections are intermediate between those two phases of the species. Most of them have the pubescence characteristic of subsp. *stramineus* but the stamen complement is more suggestive of subsp. *occidentalis*, in some few cases there are as few as thirty-two stamens but most flowers have about forty, fifty-two being the largest number seen.

Utah. Sevier County: Belknap, *Stokes* in 1900 (NY, S) and *Jones 6303* (NY, P, S. US); Burrville Canyon, *Jones 5633* (C, NY, P, US). Piute County: Marysvale, *Jones 5375p* and *7405j* (P, US); Bullion Creek, near Marysvale, *Jones 5904d* (NY, P). Arizona. Coconino County: Cape Royal, north rim Grand Canyon, *Peirson* in 1927 (P); Grand View Trail to bottom of Grand Canyon, *Ferris & Duncan 2257* (S); Grand Canyon, *Toumey* (S), *Toumey 133* (US), *Hitchcock 91* (US), and *Knowlton 258* (US); Navaho Reservation, *Vorhies 109* (C, G, NY).

2. Philadelphus Mearnsii Evans ex Rydb. N. Am. Fl. 22: 174. 1905.

A low rounded shrub probably not much over 1 m. tall, the branches rigid, more or less spinescent, bark of young stems brownish, strigose, quickly exfoliating, the old branches dark gray; leaves elliptic or lanceolate, 6–25 mm. long, pubescence of very coarse hairs almost equally grayish-strigose on both surfaces, petioles 1–3 mm. long; flowers mostly single at the ends of very short leafy stems, the hypanthium grayish-strigose, 1.5–2.5 mm. long in flower, 3 mm. long in fruit, sepals *ca.* 3 mm. long, acuminate, strigose on outer surface, lanate within; petals whitish or ochroleucous, oblong-lanceolate, 7–11 mm. long, ovate-lanceolate to lanceolate, acute or sharply 2-toothed at apex; stamens 16–20 (24), the filaments short, free; styles less than 1 mm. long, united to top, stigmas 1.5–2 mm. long, almost completely united.

Key to Subspecies of P. Mearnsii

Petals 8–10 mm. long; leaves mostly less than 15 mm. long, strigose on both surfaces with appressed pubescence; petioles 1–2 mm. long	2a. *P. Mearnsii* subsp. *typicus*
Petals 10–11 mm. long; leaves mostly over 15 mm. long, the upper surfaces with erect hairs; petioles 2–3 mm. long	2b. *P. Mearnsii* subsp. *bifidus*

2a. Philadelphus Mearnsii subsp. **typicus** nom. nov. *P. Mearnsii* Evans ex Rydb., *l.c.*

Characters as in key, the leaves rather thick, the pubescence of very coarse short hairs.

Type collection. Upper Corner Monument, Grant County, New Mexico, April 28, 1892, *Mearns 36* (G, NY, S, US).

Other material seen. New Mexico. Eddy County: Guadalupe Mts., near Three Forks of Rocky Arroyo, May 6, 1932, *Wilkens 1833* (US); Carlsbad Cave, *Bailey* in 1924 (US). Texas. Culberson County: Guadalupe Mts., above McKittrick Canyon, July 17, 1931, *Moore & Steyermark 3477* (C, G).

Because of the uniform strigose pubescence, short styles and few stamens, this entity is readily distinguished from the other species and even though it is known only through three collections, there can be no doubt of its validity. The Moore and Steyermark collection is in fruit and therefore lacks flowers, but the coarse hairs and short styles make it seem certain that it belongs here.

Although the species was described as having "about 15" stamens, those flowers of the type collection which I have examined have sixteen. The Wilkens collection also has sixteen stamens, a fact which helps to convince one that it is conspecific with the Mearns collection. However, Bailey's collection from Carlsbad has flowers with twenty-four stamens. A comparison of the Bailey and Wilkens collections cannot but convince one that they are not only conspecific but that they are too similar to be separated nomenclaturally, hence the species must be considered to have as few as sixteen (occasionally fifteen?) and as many as twenty-four stamens.

2b. Philadelphus Mearnsii subsp. **bifidus** subsp. nov.

Planta *P. Mearnsii* subsp. *typicus* similis, hoc modo differens: foliis longioribus gracilioribusque, laminis ad 30 mm. longis, supra hirsuto-hispidis, pilis erectis; petiolis 2–3 mm. longis, petalis 10–11 mm. longis, apices 2-dentibus; staminibus 24, filamentis non connatis.

Leaves longer and more slender than in subsp. *typicus,* the blades as much as 30 mm. long, pubescence of their upper surfaces hirsute-hispid, the hairs slender, scarcely at all appressed, petioles 2–3 mm. long; petals 10–11 mm. long, the apices distinctly sharply 2-toothed; stamens 24 (probably some variation), the filaments free.

Type. Sierra Madre, near Monterrey, Nuevo Leon, Mexico, May 2, 1906, *Pringle 13879* (G).

Known only from the type collections at Gray Herbarium and United States National Museum, one branch of the latter specimen with partially double flowers. Superficially this collection seems to bear little resemblance to the type of *P. Mearnsii.* However, it is evident that that collection was an extremely small-

flowered plant and that probably the other collections cited (*Wilkens 1833*) are more truly representative of the entity. Since the plant of the Wilkens collection is larger-leaved and larger-flowered, it is more suggestive of Pringle's plant from near Monterrey. Because there is so much similarity between the flowers of the two entities, the plant from Mexico is being accorded subspecific rank. Toothed, oblong petals, few stamens, short styles, and united stigmas comprise an unusual combination of characters and their presence in both these entities makes it seem logical to assume that there is close relationship between the two, a relationship that is too close to be brought out by according both of them specific status.

3. Philadelphus serpyllifolius Gray, Pl. Wright. 1: 77. 1850.

A low rounded, rather rigid shrub 1–2 m. tall, young branches brownish, densely strigose-pubescent, bark of older stems exfoliating, the old stems grayish; leaves entire, ovate-lanceolate, 6–30 (averaging about 15) mm. long, 3–12 mm. broad, 3-nerved from base, the upper surfaces greenish and often shining, from sparsely strigose to rather densely strigose and short hirsute, lower surfaces grayish, the pubescence rather dense, of long straight appressed hairs and close covering of tangled tomentum, distinctly petiolate, the petioles 1–3 mm. long; flowers commonly 1 or 3 (or 2) at the ends of short leafy shoots, the pedicels 1 or 2 mm. long; calyx usually silvery with long appressed and shorter more or less curled hairs, but sometimes the indumentum more sparse and calyx greenish, the tube 2–3 mm. long in flower, 3–4 mm. long in fruit, the lobes lanceolate, acuminate, 4–5 mm. long, densely lanate on inner surfaces; petals apparently cream colored, 6–8 mm. long, more or less oval and usually somewhat emarginate or erose; stamens usually 28 (few more or less), the filaments free; styles less than 1 mm. in length, united, the stigmas 1.5–2 mm. long, almost completely united.

Type. "Between western Texas and El Paso, New Mexico," in 1851, *C. Wright.* Very closely matched by a specimen collected near Fort Davis, Texas, *Palmer 34474.*

Material seen. New Mexico. Without definite locality, 1851–52, *C. Wright 1100* (G, NY); Mexican Boundary Survey (NY), probably the same as the first. Texas. Head of Seco, *Reverchon 54* (G), one branch of this collection has leaves only 12 mm. long whereas a younger more vigorous shoot has leaves that are 30 mm. long. Jeff Davis County: deep canyon off Limpia Canyon, near Fort Davis. *Palmer 34474* (NY, US). Edwards County: limestone bluffs, Upper Cedar Creek, *Palmer 12333* (C). Kendall County: Spring Creek, near Boerne, *Palmer 11492* (C) and *Palmer 11595, 12900* (C, P); Cibola Canyon, Boerne, *Pennell 10418* (NY), pubescence of leaves strigose above; Musquez Canyon, W. Texas, *Havard 41* (G). Culberson County: McKittrick Canyon, Guadalupe Mts., *Moore & Steyermark 3479* (C, G, NY, S).

Philadelphus serpyllifolius is, of course, closely related to *P. microphyllus* but differs strikingly because of the tomentum of the leaves and the extremely short styles. The collections from Kendall County are much less pubescent than is the rest of the material.

4. Philadelphus Purpusii Brandegee, Univ. Calif. Publ. Bot. 4: 270. 1912.

A low spreading shrub 1–2 m. tall; young branches brownish, densely strigose-pubescent, older bark grayish, winter buds quite obviously not enclosed in the leaf bases, petioles 1–4 mm. long, blades entire, ovate-lanceolate to lanceolate, usually slightly mucronate, 20–35 mm. long, 3-nerved, pubescence of both surfaces grayish-green, almost equally strigose with short thick hairs; flowers single at the ends of short branches, the pedicels 3–6 mm. long; calyces grayish-strigose, the tube 3–4 mm. long, the lobes 4–6 mm. long, acute; petals obovate to oval, 10–15 mm. long, rounded, scarcely emarginate; stamens 40–50, filaments distinct; styles 2–3 mm. long, united about one-half to four-fifths their length, basal portion and surrounding ovary grayish pilose; stigmas free, 2–3 mm. long.

Type. Minas de San Rafael, San Luis Potosi, Mexico, *Purpus 5368*.

Known only from two collections from the type locality, *Purpus 5368* (C, G, NY) and *Purpus 4910* (G, US).

Philadelphus Purpusii is most easily distinguished because of the pilosity of the styles and upper ovary, but the grayish-green strigose leaves, large petals, and exposed buds are all features that help to make it the distinctive species that it is.

University of Washington, Seattle,
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A NEW SPECIES OF PHACELIA FROM SALINE VALLEY, CALIFORNIA

Lincoln Constance

Phacelia amabilis sp. nov. Herba annua vel biennis, omnino glanduloso-puberula et hispida praecipue in calycibus inflorescentibusque, circa 1 m. alta; caulis crassus ramosus; folia petiolata oblonga oblongo-ovatave, 8–15 cm. longa, 3–5 cm. lata, pinnatifida, lobis oblongis dentatis, summa reducta minus alte divisa; inflorescentia corymbosa, cymis 5–12 cm. longis in fructu erectis; pedicelli in fructu 2–3 mm. longi; calycis lobae anguste lanceolatae, 3–5 mm. longae, 1–2 mm. latae, corolla plus quam dimidio breviores, capsulam leviter excedentes; corolla late campanulata, 7–8 mm. longa, 8–12 mm. lata, alba, lobis integris; appendiculae supra tubae basin minus quam 1 mm. insertae, parte libera lata; stamina exserta; stylus exsertus, pallido-lilacinus;